Operating Manual

[redacted]

TTC™

OPTIMIZING NETWORK PERFORMANCE

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Rev. C

ISU-6000
INTERFACE SWITCHING
MANUAL

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SECTION 1 GENERAL INFORMATION

1.1 INTRODUCTION

This manual provides information on the installation, operation, and maintenance of Telecommunications Techniques Corporation's (TTC's) ISU-6000 Interface Switching Unit.

1.2 INSTRUMENT OVERVIEW

The ISU-6000 Interface Switching Unit (ISU) is a rack-mountable product capable of accommodating multiple data interface modules and electronically selecting one interface for use with the FIREBERD 6000. Using this device, the user can operate a FIREBERD 6000 without handling interfaces or moving cables. Switching between the installed interfaces is controlled by the FIREBERD 6000 Interface Setup menu.

A single ISU-6000 is designed to accommodate four data interfaces. The components for the four-interface configuration are:

- One Interface Shelf (Model 10805)
- One Single Cable Interface Adapter (Model 40678)
- One Flush Door (Model 10518) (optional)

Figure 1-1 shows a block diagram of the ISU-6000.

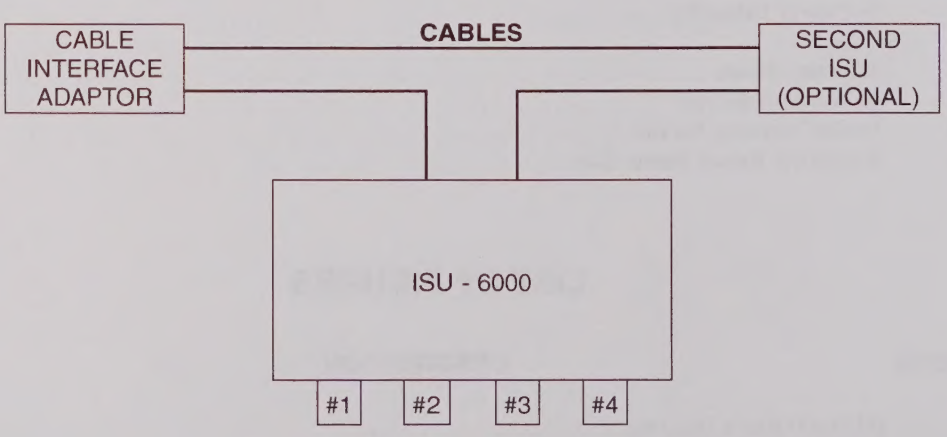


Figure 1-1. ISU-6000 Block Diagram

1.3 SUMMARY OF KEY FEATURES AND CHARACTERISTICS

- Accepts all currently available data interface modules for the FIREBERD 6000.
- **Front or rear mounting** allows data interface modules to face either the front or the back of the equipment rack.
- **A Cable Interface Adaptor** with two shielded ribbon cables provides the interconnection between the FIREBERD 6000 and the ISU-6000. This adaptor is offered in two versions:

  Version -01 provides interconnections for a single ISU-6000.

  Version -02 provides interconnections for two ISU-6000s.
- **Isolation of inactive interfaces** while the selected interface is connected to the FIREBERD 6000 Remote Control Interface.
- **115 VAC or 230 VAC** power supply.

1.4 OPTIONS AND ACCESSORIES

This section describes the options and accessories that are available for use with the ISU-6000.

1.4.1 Dual Configuration

The dual configuration option permits two ISU-6000s to be configured with an adaptor cable for handling as many as eight data interface modules. The components for the eight-interface configuration are:

- Two Interface Shelves (Model 10805).
- One Dual Cable Interface Adaptor (Model 40681).
- Two Flush Doors (Model 10518) (optional)

1.4.2 Flush Door Accessory

The ISU-6000 Flush Door accessory (Model 10518) recesses the ISU-6000 panel approximately 4 ½" behind the rack mount surface and provides a smoke grey plexiglass door. It conceals the interface modules and cables, thus providing a clean, uncluttered appearance while still allowing access to the interface module front panels.

1.5 SPECIFICATIONS

- **Product Compatibility**: FIREBERD 6000 series only.
- **Interfaces**: Compatible with all of the interface modules that are available for FIREBERD Communications Analyzers.
- **Interface to FIREBERD**: Connection via shielded ribbon cables attached to a special interface.
- **Inactive Interfaces**: Placed into self-loop, thus isolating them from the outside world.
- **Switching**: Invoked locally via the FIREBERD 6000 front panel. Invoked remotely via the FIREBERD 6000 remote control interface.
- **Controls and Indicators**: The ISU-6000 LEDs indicate the currently active interface. The INTF SETUP menu displays the currently active interface on the FIREBERD 6000.
- **Clock Rate**: The ISU-6000 is guaranteed for operation at clock rates up to 8.5 MHz. It typically operates to a maximum clock rate of 13 MHz.

NOTE

To avoid problems with waveform distortion, care should be exercised to provide clock signals with a 50% duty cycle at high data rates.

- **Time Delay**: Approximately 75 nanoseconds in each direction between the interface connectors and the FIREBERD 6000. This means that the round trip delay (for example, between an external clock input and a transmit clock output) is increased by approximately 150 nanoseconds.
- **Size**: 5¼" H x 13" D x 19" W (13.3 cm x 33.0 cm x 48.3 cm).
- **Weight**: 10.5 pounds (4.8 kg).
- **Power**: Selectable 115/230 VAC ± 10%, 48 to 66 Hz at 60 VA maximum per shelf.
- **Environment**: 0°C to 50°C operating (32° F to 122° F). -40° C to +75° C storage (-40° F to 167° F).

SECTION 2 PREPARATION FOR USE

2.1 INTRODUCTION

This section contains information on unpacking, inspecting, and installing the ISU-6000.

2.2 UNPACKING AND INITIAL INSPECTION

The ISU-6000 shipping container should be inspected for damage when it is received. If the shipping container or shipping material is damaged, keep the shipment until its contents have been checked for completeness and the instrument has been checked mechanically and electrically. If the contents are incomplete, if there is mechanical damage or defect, or if the ISU-6000 does not operate properly, notify TTC. If the shipping container is damaged, notify the carrier as well as TTC, and keep the shipping container and materials for the carrier's inspection.

2.3 EQUIPMENT INCLUDED

The following is a list of the equipment that should be present when the ISU-6000 shipment is received and unpacked.

(1) ISU-6000 Chassis

(2) Cable Interface Adaptor

(3) AC Power Cord

(4) Rack Mount Ears

(5) Operating Manual

The ISU-6000 Chassis is the unit into which all data interface modules are inserted and is mounted in the equipment rack. Note that a Dual ISU-6000 includes two ISU chassis.

The Cable Interface Adaptor is inserted into the interface slot on the back of the FIREBERD 6000. It includes a pair of shielded ribbon cables which end at a connector plate — this plate is inserted into the ISU-6000 chassis. The Cable Interface Adaptor is available in two different versions — Version -01 has one connector plate and attaches to one ISU chassis; Version -02 has two connector plates and attaches to two ISU chassis. Note that Version -02 may also be used with only one ISU chassis.

2.4 PRECAUTIONS

The following safety precautions must be observed before and during all phases of ISU-6000 operation.

1. **GROUND THE INSTRUMENT.** To minimize shock hazard, the instrument must be connected to an acceptable electrical (earth) ground. The ISU-6000 is equipped with a three-conductor AC power cable. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adaptor with grounding wire (green) firmly connected to an electrical ground at the power outlet.

2. **USE PROPER LINE VOLTAGE SETTING AND FUSE SIZE.** Before connecting the AC power cord, verify that the line voltage indicated is the correct operating voltage. The ISU-6000 must also be operated with a 5 x 20 mm, 1A, 250V, Slo-Blo fuse for operation at either 115 or 230 VAC. Always use the correct fuse size.

3. **AVOID LIVE CIRCUITS.** Do not remove the instrument cover or insert fingers or other objects through the cable/ventilation holes while the AC power cord is connected.

4. **DO NOT SERVICE THE INSTRUMENT.** Component replacement and service may only be performed by TTC-authorized personnel.

5. **DO NOT OPERATE IN AMBIENT TEMPERATURE ABOVE 50°C (122°F).** Allow adequate ventilation to prevent damage to the instrument.

6. **REMOVE POWER FROM THE INSTRUMENT BEFORE INSTALLING OR REMOVING INTERFACES.** Unselected interfaces remain powered while the ISU-6000 is turned on. To prevent damage, turn the ISU-6000 off before installing or removing interfaces.

TTC assumes no liability for any failure to comply with these safety precautions.

2.5 POWER REQUIREMENTS

The ISU-6000 is normally shipped from the factory wired for 115 VAC, single phase 60 Hz line current; however, the unit can optionally be wired for 230 VAC, single phase 50 Hz line current. In either case, the maximum power required is 65 volt-amperes. (Actual power consumption depends on the interfaces installed.)

The ISU-6000 requires a 5 x 20mm, 1A, 250V, Slo-Blo fuse for operation at either 115 or 230 VAC. A spare fuse is included inside the fuse holder.

2.6 ISU-6000 INSTALLATION

2.6.1 Single Unit Installation

The ISU-6000 requires only four screws (not included) to mount the unit in a 19" equipment rack with EIA hole spacing. The unit can be mounted either above or below the FIREBERD 6000. The cable to

the FIREBERD 6000 and the power cord attach to the ISU-6000 chassis inside an opening behind the front panel.

Single-Unit Installation With the ISU-6000 Above the FIREBERD 6000

The recommended procedure for installing a single ISU-6000 above the FIREBERD 6000 is as follows:

1. Set the **TERM/UNTERM** switch on the top of the ISU-6000 chassis to the TERM position.

2. Install the Cable Interface Adaptor cable plate in the ISU-6000 chassis opening (routing the ribbon cable out the bottom of the chassis opening). After ensuring that the cable plate is seated properly, tighten the two cable mounting thumbscrews.

3. Plug the power cord into the receptacle inside the chassis opening.

4. Mount the ISU-6000 chassis. (The installed interfaces may face either the front or the back of the equipment rack.)

5. Route the cable to where the FIREBERD 6000 is to be mounted in the equipment rack.

6. Mount the FIREBERD 6000 in the equipment rack. Ensure that the unit is within reach of the 3-foot Cable Interface Adaptor.

7. Plug the Cable Interface Adaptor into the back of the FIREBERD 6000.

8. Connect the power cords for both the FIREBERD 6000 and the ISU-6000 into an AC power source.

Single-Unit Installation With the ISU-6000 Below the FIREBERD 6000

The recommended procedure for installing a single ISU-6000 below the FIREBERD 6000 is as follows:

1. Set the **TERM/UNTERM** switch on the top of the ISU-6000 chassis to the TERM position.

2. Plug the power cord into the receptacle inside the chassis opening.

3. Install the Cable Interface Adaptor cable plate in the ISU-6000 chassis opening (looping the ribbon cable out the top of the chassis opening). After ensuring that the cable plate is seated properly, tighten the two cable mounting thumbscrews.

4. Mount the ISU-6000 chassis. (The installed interfaces may face either the front or the back of the equipment rack.)

5. Route the cable to where the FIREBERD 6000 is to be mounted in the equipment rack.

6. Mount the FIREBERD 6000 in the equipment rack. Ensure that the unit is within reach of the 3-foot Cable Interface Adaptor.

7. Plug the Cable Interface Adaptor into the back of the FIREBERD 6000.

8. Connect the power cords for both the FIREBERD 6000 and the ISU-6000 into an AC power source.

2.6.2 Dual-Unit Installation

In a dual-unit installation, two ISU-6000 chassis can be mounted either above or below the FIREBERD 6000. The two ISU chassis must be mounted with one directly on top of the other, and must face in the same direction.

Dual-Unit Installation With the ISU-6000s Above the FIREBERD 6000

The recommended procedure for installing a dual-unit ISU-6000 above the FIREBERD 6000 is as follows:

1. Choose one of the ISU-6000s as the lower chassis.
2. Set the **TERM/UNTERM** switch located on the top of the lower chassis to the UNTERM position.
3. Pass both connector plates through the chassis opening from below.
4. Attach the lower connector plate to the lower chassis. After ensuring that the cable plate is seated properly, tighten the two cable mounting thumbscrews.
5. Plug the power cord into the receptacle inside the lower chassis opening.
6. Set the **TERM/UNTERM** switch on the top of the upper ISU-6000 chassis to the TERM position.
7. Holding the upper chassis above the lower chassis, pass the connector plate through the chassis opening. Place the upper chassis on top of the lower chassis.
8. Plug the power cord into the receptacle inside the upper chassis opening.
9. Attach the upper connector plate to the upper chassis. After ensuring that the cable plate is seated properly, tighten the two cable mounting thumbscrews.
10. Mount both upper and lower chassis in the equipment rack.
11. Route the cable to where the FIREBERD 6000 is to be mounted.
12. Mount the FIREBERD 6000 in the equipment rack. Ensure that the unit is within reach (3 feet) of the cable.
13. Plug the Cable Interface Adaptor into the back of the FIREBERD 6000.
14. Connect the power cords for both the FIREBERD 6000 and the ISU-6000s into an AC power source.

Dual-Unit Installation With the ISU-6000s Below the FIREBERD 6000

The recommended procedure for installing a dual-unit ISU-6000 below the FIREBERD 6000 is as follows:

1. Choose one of the ISU-6000s as the lower chassis.

2. Plug the power cord into the receptacle inside the lower chassis opening.

3. Set the **TERM/UNTERM** switch located on the top of the lower chassis to the UNTERM position.

4. Pass both connector plates through the chassis opening from the top.

5. Attach the connector plate closest to the Cable Interface Adaptor to the lower chassis. After ensuring that the cable plate is seated properly, tighten the two cable mounting thumbscrews.

6. Set the **TERM/UNTERM** switch on the top of the upper ISU-6000 chassis to the TERM position.

7. Holding the upper chassis above the lower chassis, pass the connector plate and Cable Interface Adaptor through the chassis opening. Place the upper chassis on top of the lower chassis.

8. Plug the power cord into the receptacle inside the upper chassis opening.

9. Attach the upper connector plate to the upper chassis. After ensuring that the cable plate is seated properly, tighten the two cable mounting thumbscrews.

10. Mount both upper and lower chassis in the equipment rack.

11. Route the cable to where the FIREBERD 6000 is to be mounted.

12. Mount the FIREBERD 6000 in the equipment rack. Ensure that the unit is within reach (3 feet) of the cable.

13. Plug the Cable Interface Adaptor into the back of the FIREBERD 6000.

14. Connect the power cords for both the FIREBERD 6000 and the ISU-6000s into an AC power source.

2.6.3 Flush Door Installation

To mount the flush door accessory on the ISU-6000 use the following procedure.

1. Remove the two rack mount brackets (if they have been installed). Save the either 8-32 x 3/8" pan head machine screws and lock washers.

2. Remove the filler plate at the top of the ISU-6000 front panel to mount the flush door panel on that face. The filler plate is held in place by two black oxide screws.

3. Position the flush door accessory so that the four screws holes on either side of the unit line up with the holes in the chassis. The flush door fits on either face of the ISU-6000.

4. Reinstall the 8-32 x 3/8" screws to secure the flush door to the chassis.

SECTION 3 OPERATING THE ISU-6000

3.1 INTRODUCTION

This section describes the operational considerations associated with the ISU-6000. It features a functional description and operating instructions. Please note that this section assumes familiarity with the FIREBERD 6000, particularly menus, soft keys, and remote control operation; those unfamiliar with these topics should refer to the *FIREBERD 6000 Communications Analyzer Operating Manual.*

3.2 FUNCTIONAL DESCRIPTION

The ISU-6000 serves to connect one of four or eight data interface modules to the FIREBERD 6000 while isolating all unselected data interface modules. (Three-state buffers are used to connect and isolate the interfaces.) The ISU-6000 processes its own power supply, all interfaces are powered whenever the unit is turned on. Each unselected interface is placed in a self-loop state which isolates it from any outside circuit to which it is connected. The self-loop state is identical to the self-loop function controlled by the FIREBERD 6000 **SELF LOOP** switch.

3.3 SELECTING AN INTERFACE

To select an interface, use the FIREBERD 6000 Interface Setup Menu.

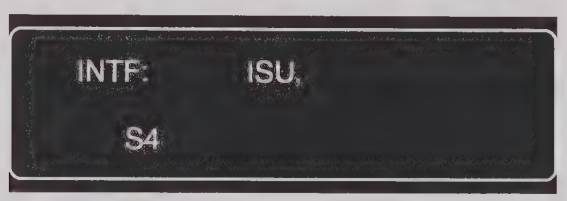
1. Scroll to the INTF SETUP position using the **MENU** switch.

RESULT: The softkey labels INT232 and ISU are displayed. If a Dual Unit Cable Interface is in use, the softkey labels INT232, ISU1, and ISU2 are displayed.

2. Press the ISU (or the ISU1 or ISU2) softkey

RESULT: The masks for the interfaces installed in the first three slots of the ISU-6000 are displayed. The upper half of the display shows the currently selected interface.

Press the MORE key to display the mask for the interface installed in the fourth slot of the ISU-6000.

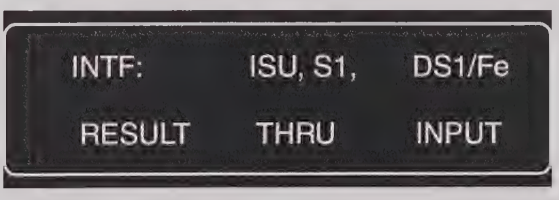


3. Select an interface by pressing the softkey that corresponds to the slot where the interface is installed.

RESULT: The name of the active interface appears in the upper part of the display. (All interface masks are replaced by the names of the installed interfaces when INT 232 is not selected.) If the selected slot in the ISU-6000 is empty, no action is taken; the error message **`EMPTY SLOT SELECTED`** is displayed.

EXAMPLE 1: The softkey for the V.35 interface is selected (S3). All masks are removed, and the name of the selected interface appears in the upper line of the display.

EXAMPLE 2: The softkey for the DS1/Fe interface is selected (S1). All masks are removed, and the name of the selected interface appears in the upper line of the display.



NOTE

When selecting an interface with a functional menu (e.g., DS1/Fe) the menu is always displayed on the lower line in lieu of the names of the installed interfaces.

When a dual unit cable interface is used with only one ISU, the missing ISU is represented with all slots empty. If the ISU is not powered on, all slots are represented as empty.

3.4 REMOTE CONTROL

The FIREBERD 6000 Remote Control Interface enables control of the ISU-6000. Remote control is accessed through an RS-232 or IEEE-488 interface.

For detailed instructions on remotely controlling the FIREBERD 6000, refer to the *FIREBERD 6000 Communications Analyzer Operating Manual* and the *FIREBERD 6000 Remote Control Commands Handbook*.

3.4.1 Remote Control Commands

This section presents all remote control commands that are specific to operation of the ISU-6000. Bold characters indicate user commands or responses.

HELP ISU **HELP ISU**

ISU Help Function

HELP ISU :Display ISU help information

The **HELP ISU** command provides information related to the ISU remote control command. **HELP ISU** also lists the interfaces that are currently installed in the ISU-6000.

The examples below depict a typical **HELP ISU** display for a single chassis and dual chassis configuration, respectively.

NOTE

When the RS-232 interface installed in the FIREBERD 6000 is active, softkey slot numbers are displayed in lieu of the names of the interfaces installed in the ISU-6000 (Example 2).

EXAMPLE 1

>HELP ISU

1 RS449

2 EMPTY

3 S1/Fe

4 V.35

EXAMPLE 2

>HELP ISU

1: S1

2: S2

3: S3

4: S4

INT RS232 IS OPERATIONAL

EXAMPLE 3

>HELP ISU

1:1 RS449

1:2 EMPTY

1:3 DS1/Fe

1:4 V.35

2:1 DS0

2:2 MILBAL

2:3 8MG703

2:4 EMPTY

ISU **ISU**

ISU-6000 Remote Control

ISU	:Display the currently active interface
ISU slot-number	:Activate interface in single chassis configuration
ISU chassis-number:slot-number	:Activate interface in dual chassis configuration

The **ISU** command controls the selection of interfaces from a remote control unit. **ISU** displays the currently selected interface within the ISU-6000. **ISU slot-number** activates a new interface in a single chassis configuration. **ISU chassis-number:slot-number** activates a new interface in a dual chassis configuration.

When changing the currently active interface, the indicator light associated with the selected interface (to the left of the slot number on the ISU-6000) is illuminated. If none of the interfaces in the ISU-6000 are active, the following message is displayed:

ISU IS NOT SELECTED

EXAMPLE 1:

>ISU	:display the currently active interface
V.35	
>ISU3	:the interface in slot #3 is selected
>	

EXAMPLE 2:

ISU 2:3	:the interface in chassis 2, slot #3 is selected
>	

SECTION 4 MAINTENANCE AND SERVICE

4.1 INTRODUCTION

This section contains information on maintenance and service for the ISU-6000. Specifically, it includes steps to take should the user experience difficulty operating the unit and a description of TTC's warranty and repair procedures.

4.2 MAINTENANCE

4.2.1 Case of Difficulty

If the ISU-6000 fails to operate and the POWER indicator is not illuminated:

1) Check that the AC power cord is securely connected to the ISU-6000 and ensure that the power supply is uninterrupted.
2) Verify that the instrument is wired for the correct line voltage.
3) Ensure that a proper, working AC line fuse is installed.

If the AC power cord, power supply, and fuse are in proper working order, but the instrument fails to operate:

1) Verify that the software revision level of the FIREBERD 6000 is Rev. D or higher (AUXILIARY FUNCTION 40 on the FIREBERD 6000).
2) Ensure that the cable interface adaptor is securely plugged into the FIREBERD 6000, that the connector plate is plugged into the ISU chassis, and that the captive screws have been tightened.

If the ISU-6000 still fails to operate properly, contact TTC for assistance.

4.3 SERVICE

4.3.1 Warranty Policy

All equipment manufactured by TTC is warranted against defects in material and workmanship. This warranty applies only to the original purchaser and is non-transferable unless express written authorization of the warranty transfer is granted by TTC.

The ISU-6000 will be repaired or replaced (at our option) at no charge for a period of three (3) years after shipment to the customer. All equipment other than the above mainframe will be repaired or replaced (at our option) at no charge for a period of one (1) year after shipment to the customer.

Liability under this warranty extends only to the replacement value of the equipment. The warranty is void under the following conditions.

1) Equipment has been altered or repaired without specific authorization from TTC.
2) Equipment is installed or operated other than in accordance with instructions contained in TTC literature and operating manuals.

No other warranty is expressed or implied. TTC is not liable for any direct, indirect, incidental, or consequential damages.

4.3.2 In-Warranty Service

Equipment in warranty must be returned to the factory or authorized service center with shipping prepaid. The equipment should be packed and shipped in accordance with the Equipment Return Instructions. Before returning any equipment, the customer must obtain a Return Authorization (RA) number by contacting the nearest TTC Repair Center. The RA number should appear on all paperwork and be clearly marked on the outside of the shipping container.

After the equipment is repaired by TTC, it is tested to applicable specifications and returned to the customer with shipping prepaid. A brief description of the work performed and the materials used is provided on the Equipment Repair Report furnished with the returned equipment.

4.3.3 Out-of-Warranty Service

The procedure for repairing out-of-warranty equipment is the same as the one used for equipment still in warranty. However, there is a minimum charge applied to each request for out-of-warranty service. The minimum charge guarantees the customer an estimate of the repair costs and is used as credit against actual materials and labor costs should the equipment be repaired. Contact the TTC Repair Center for specific information on the minimum out-of-warranty repair charge.

The customer will be billed for parts plus standard labor rates in effect at the time of the repair. The customer will also be required to furnish a purchase order number before repair work can be started, and a hard copy of the purchase order must be received by TTC before the repaired equipment may be shipped to the customer. A description of the labor and materials used is provided in the Equipment Repair Report.

Once an out-of-warranty repair is made, the repaired part or component is warranted for one (1) year. This warranty applies only to the part or component that was repaired-, other parts or components are not covered under the one (1) year repair warranty.

4.3.4 Equipment Return Instructions

To all equipment returned for repair, attach a tag that includes the following information.

1) Owner's name and address.
2) A list of the equipment being returned and the applicable serial number(s).
3) A detailed description of the problem or service requested.
4) The name and telephone number of the person to contact regarding questions about the repair.

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